# Microstructured Polyacrylate Surfaces Generated by UV&EB Curing

*Reiner Mehnert, A. Sobottka, Ch. Elsner, Institut für Oberflächenmodifizierung, Permoserstr. 15, D-04303 Leipzig, Germany*

### Introduction

During the last decade we observed an increasing scientific interest in fluid-dynamic effects caused by biological surfaces. It has been shown by Abramsom [ 1 ] and later by Barthlott and coworkers [ 2,3 ] that the well-known perfect cleaning of e.g. Lotus ( Nelumbo nucifera) leafs is caused by water droplets which are able to easily release impurity particles from the leaf surface. A comparison with leaf structures exhibiting no "self-cleaning" effect showed that a certain surface microstructure and water repellency are necessary prerequisites for self-cleaning properties of leafs. Due to the surface microstructure, impurity particles "feel" a reduced contact area, i.e. the energy needed to release them from the leaf surface is decreased. In addition, microscopic wax crystals covering the leaf surface lead to an extremely low surface energy at the solid-liquid interface . Water droplets rinsing over the leaf surface are now able to overcome the "attraction" between impurity particles and the leaf surface. The particle is released from the leaf and bound to the water droplet surface( see Figure 1 ).

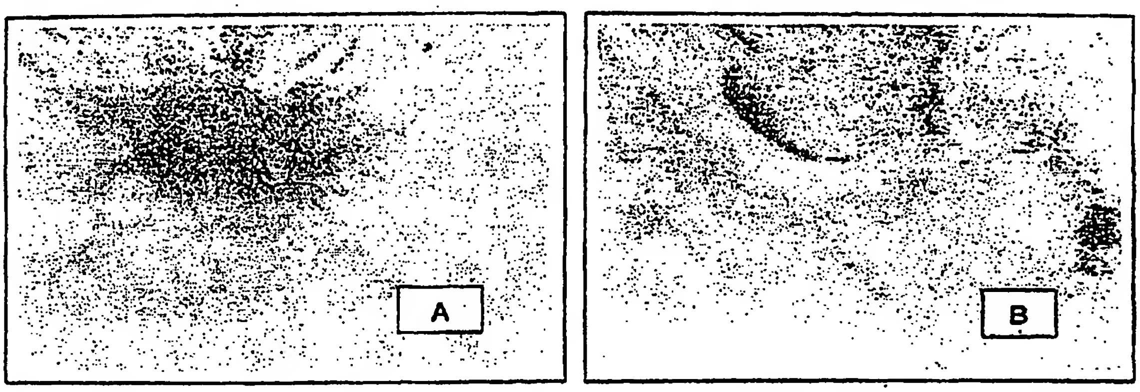


Figure 1 A) Impurity particles on a leaf B) Removal of the particles by a water droplet

In addition, nature teaches us how microstructured surfaces can lead to wall shear stress reduction in a turbulent flow. Using this principle drag reduction can be achieved for moving animals or vehicles.

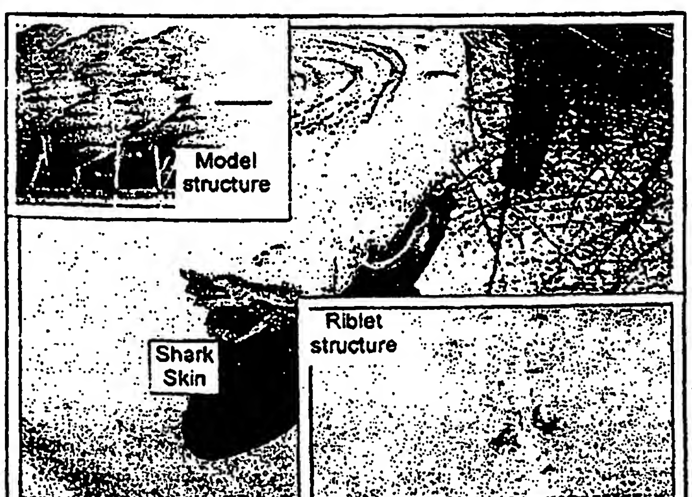


Figure 2 Riblet structure of shark skin.

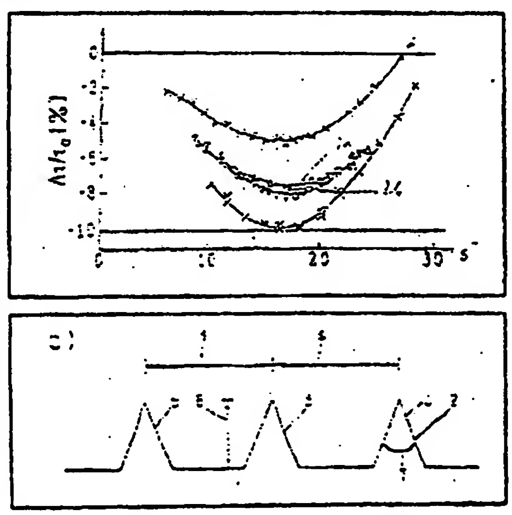

Figure 3 Drag reduction ( $\Delta\tau/\tau$) as function of (normalized) velocity $s^+$. Below: Artificial riblet structure.

First Bechert et al. [ 4,5 ] have pointed out that the microstructures of the shark skin are tools designed by nature during evolution aimed to reduce drag, i.e. to minimize the energy consumption during movement. For structures